

## WE CLAIM:

1. A micro-electromechanical fluid ejection device that comprises  
a substrate that defines a plurality of fluid supply channels and a plurality of chambers in  
5 fluid communication with respective fluid supply channels;  
a drive circuitry layer that is positioned on the substrate;  
a plurality of roof structures that are connected to the drive circuitry layer to cover respective  
fluid chambers, each roof structure defining a fluid ejection port; and  
at least one actuator that is positioned in each roof structure, each actuator being electrically  
10 connected to the drive circuitry layer to be displaceable into and out of its respective chamber to  
eject a drop of fluid from the fluid ejection port.
2. A micro-electromechanical fluid ejection device as claimed in claim 1, in which a number of  
actuators are positioned in each roof structure about the ink ejection port.
- 15 3. A micro-electromechanical fluid ejection device as claimed in claim 2, in which each  
actuator includes an actuator arm that is connected to the drive circuitry layer and extends towards  
the fluid ejection port, a heating circuit being embedded in the actuator arm to receive the electrical  
signal from the drive circuitry layer, the actuator arm being of a material that has a coefficient of  
20 thermal expansion sufficient to permit the material to perform work as a result of thermal expansion  
and contraction, the heating circuit being positioned so that the actuator arm is subjected to  
differential thermal expansion and contraction to displace the actuator arm towards and away from  
the respective fluid supply channel.
- 25 4. A micro-electromechanical fluid ejection device as claimed in claim 3, in which each  
actuator arm is of polytetrafluoroethylene while each heating circuit is one of the materials in a  
group including gold and copper.
5. A micro-electromechanical fluid ejection device as claimed in claim 3, in which each  
30 actuator arm includes an actuating portion that is connected to the drive circuitry layer and a fluid  
displacement member that is positioned on the actuating portion to extend towards the fluid ejection  
port.
6. A micro-electromechanical fluid ejection device as claimed in claim 3, in which each roof  
35 structure includes a rim that defines the fluid ejection port, the rim being supported above the

respective fluid inlet channel with support arms that extend from the rim to the drive circuitry layer, the actuator arms being interposed between consecutive support arms.

7. A micro-electromechanical fluid ejection device as claimed in claim 1, in which the drive  
5 circuitry layer is a CMOS layer.